

KINEMATIC ASTRONOMY OF THE PAST AND FUTURE.

The Ancients as well as the Moderns must have noticed that the Planets increased and diminished alternately in apparent size; and no doubt attributed the variation to the periodical change of distance.

It was further noticed that the motion of the Planets was not uniform nor continuously in the same direction; that their apparent progress was sometimes faster, sometimes slower, than they were occasionally stationary for a time and even retrograde; and that these incidents occurred periodically. It was soon found, however, that all these phenomena could be readily accounted for by assuming that the Planets had a second circular movement within the zone of space to which their wanderings seemed restricted. The investigation of these facts &c. probably led to the adoption of the Epicyclic System of Ptolemy and Hipparchus; and will eventually lead to its revival as the Astronomy of the Future.

About sixty years ago, Cassini made systematic observations of the principal Planets, with a view to ascertain their geocentric orbits. Taking for granted that when at their greatest apparent magnitudes they were nearest to the Earth, and farthest from it when at least magnitude, and that their intermediate variations of magnitude were proportional to their geocentric distance, he made maps of their successive positions and apparent magnitudes; and found thereby that their geocentric orbits were looped curves, of which he published rough diagrams. These Curves are Epicyclic Curves, now called Bicircloids, from their being resultants of two circular movements; and the annexed figures, traced by machinery, are authentic representations of Kinematic Curves to which the Cassini Orbits approximate.

Of course they are only exhibited as representative types of the respective Curves. The real Curves of the planetary orbits do not return into themselves until after ages of ages of revolutions in their orbits, if they ever do so at all; but they periodically retrace nearly the same paths they had previously traversed, in a zone of space bounded by the apocentral and pericentral circles of which the Earth is the centre.

The following are the elements of the Kinematic Curves approximating to the typical figures of the Planetary Orbits, according to Cassini:—

| Planets. | Velocity ratio. | Radial ratio. |
|----------|--------------------|------------------|
| Mars | = 1 : 1 and 2 : 3 | |
| Venus | = 5 : 8 " | 7 : 10 |
| Juno | = 10 : 3 " | 3 : 8 |
| Jupiter | = 11 : 1 " | 1 : 5 |
| Mercury | = 22 : 7 " | 2 : 5 |
| Saturn | = 57 : 2 " | 2 : 19 |
| Uranus | = 84 : 1 " | 1 : 19 |
| Neptune | = 216 : 1 " | 1 : 36 |
| Moon | = 40 : 3 " | 1 : 375 |

9, NORTH CRESCENT, BEDFORD SQUARE.

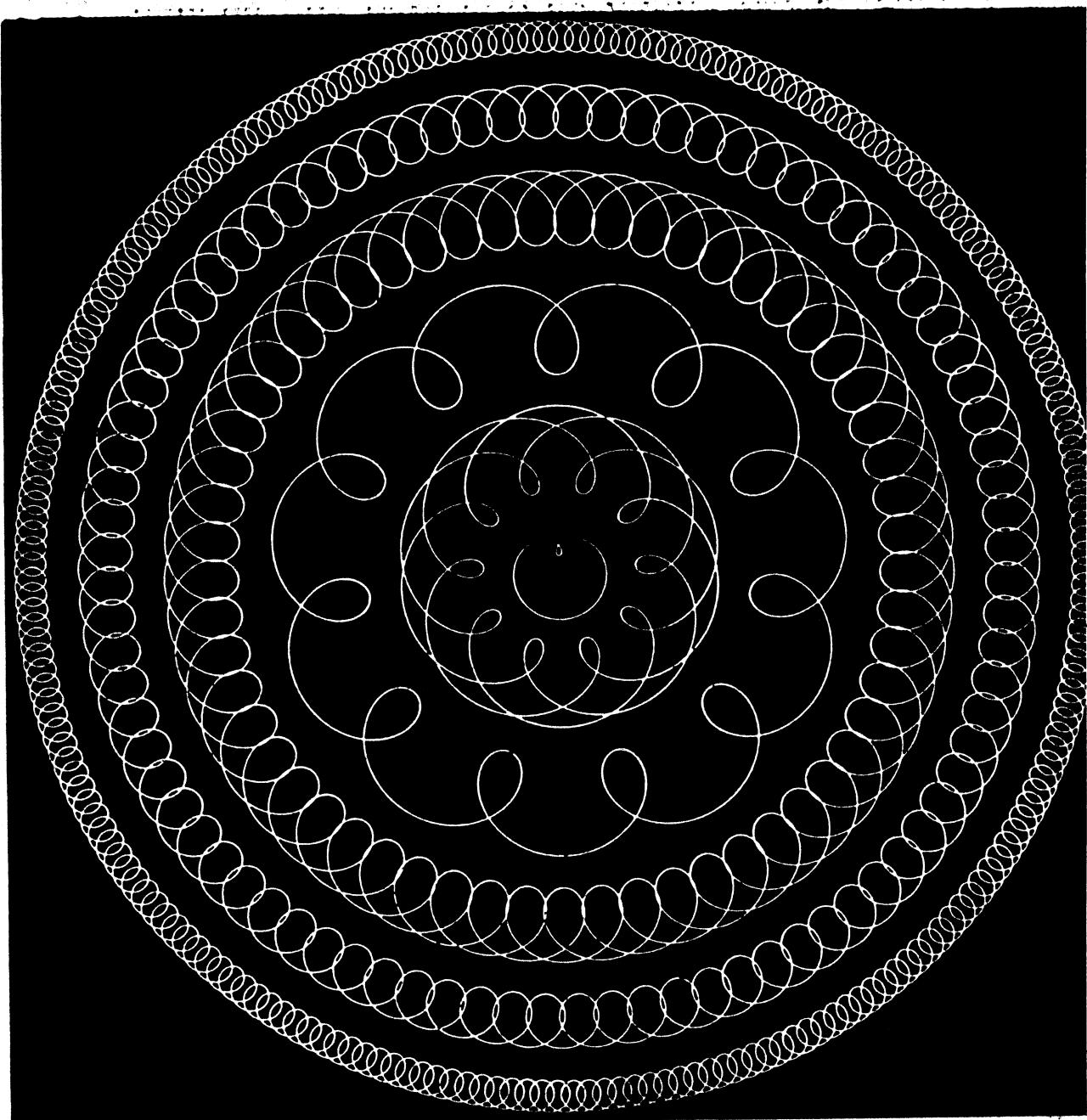
October 12th, 1871.

HENRY PERIGAL.

KINEMATIC BICIRCLOIDS

The Resultants of two Circular Movements in the same plane, representing typical forms of the geocentric
ORBITS OF THE PLANETS

discovered by Ancient Astronomers, re-discovered and verified from test observations
BY CASSINI.



GEOCENTRIC ORBITS

or

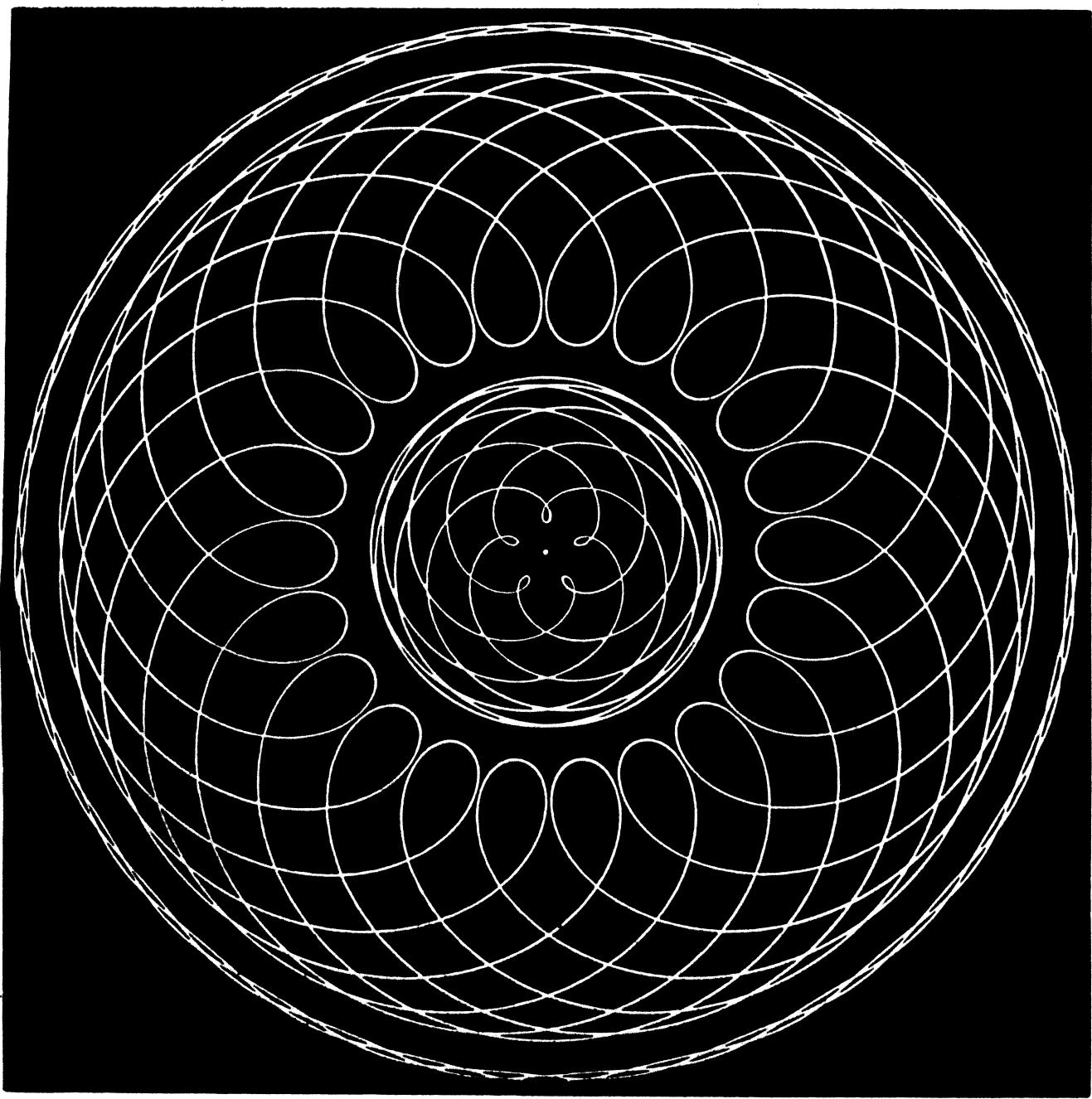
MARS (the central figure), JUNO, JUPITER, SATURN, URANUS, NEPTUNE.

Arranged according to the approximate number of Loops described by each Planet in its orbital revolution;
irrespective of the comparative size of the Orbits, and of their relative positions in space.

These Epicyclic Curves were generated by Revolution and Rotation, being engraved by a revolving Cutter
on a rotating Plane of type metal, by means of the Turners' Lathe.

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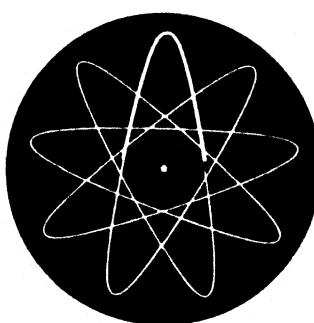
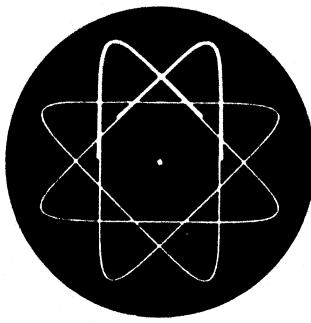
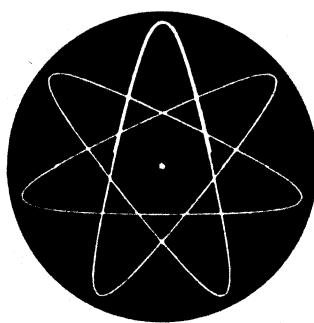
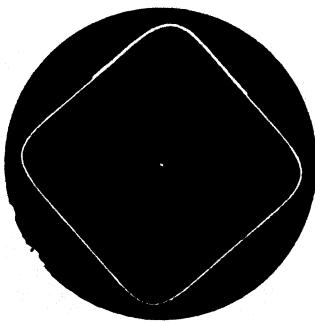
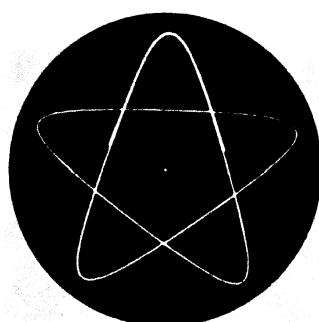
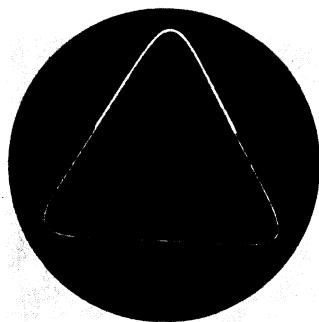
VENUS (central figure), MERCURY, MOON.

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The Resultants of two Circular Movements in the same plane, representing typical forms of the geocentric
ORBITS OF THE COMETS.



HYPERBOLITES AND PARABOLITES.

A peculiar class of Bicircloids, compounded of hyperbolic or of parabolic branches : (a slight variation in their radial-ratios converting them into Ellipsites). The curvature is greatest at the apocenters ; gradually diminishing to a minimum at the pericenters, at which point there is no curvature : then it increases gradually to a maximum, again decreases to *nil.* ; and so on alternately till the curve returns into itself.

The looped curve in the centre of each figure is the centric phase of the same curve on a smaller scale.

This class comprises curves of any number of branches or loops, determined by the velocity-ratio ; the phases of the curve vary with the radial-ratio.